

## I N T R O D U C T I O N

The humid tropical region has weed problems peculiar to itself and probably not equalled in any other regions of the world. In this region with heavy rainfall, short dry season, and high temperature, the life of the farmer is a long fight against the rank growth of vegetation.

In the struggle of weeds with crops for space, light, plant nutrients and moisture, useful plants have been hampered relative to weeds in absence of outside assistance. Examples of this are sadly frequent and total loss of crops sometimes occurs, and in a large proportion of crops, reduction in yield more or less serious is occasioned. Were it possible to calculate the total annual loss, directly or potential which occurs in this region as a result of weed encroachment, the results would certainly be staggering.

An enormous amount of labour is required annually for intercultivation of annual crops and this makes up a significantly high proportion of the cost of arable crop production in the humid tropics. In most of these areas, a main limit to crop production by the ordinary farm family is the heavy burden of labour required during the early part of the rainy season. It is in this period that the ground is prepared, annual crops established and most of the early hoeings carried out. Report of a Survey of problems in the mechanisation of Native Agriculture in the Tropical African Colonies (Col. Advisory Council, 1949) shows that this busy season task is fully twice the harvest task and it has to be completed in a few weeks. The cultivation of three or four acres is as much as an ordinary peasant family can accomplish early enough to prevent late weeding which may depress his yields.

It is mainly because of this serious weed problem during the peak period that the family farms in these areas tend to be small and intensively cropped. Mixed cropping is generally

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practised and the spacing of the crops is as close as possible as these tend to cover the soil and check excessive weed growth, therefore reduce the labour required for intercultivation. (Faulkner & Mackie, 1933)

In many parts of the world, like in Europe, where land is scarce and rent high, the utility or otherwise of any agricultural improvement is judged largely by the profit or loss per acre and anything which will increase the profit per acre is generally of merit and likely to be adopted by the farmer. In most parts of the humid tropics, however, except in few well defined regions like some of the over-populated areas of the West Indies and near large towns, land is plentiful, generally no rent is paid and every native has a right to a piece of land. The factor which really counts is labour. Practically every operation on the farm has to be carried out by hand and the test of soundness is the return per normal day's work. Hired labour for the farms, especially during the peak periods when each peasant farmer is busy on his family farm, is either unavailable or procured at a most uneconomic price. A man and his family can only do so many day's work during the year especially during the peak period, and this strictly limits the amount of land he can cultivate.

The available labour supply will surely get worse in future with the decline of polygamy and the introduction of universal education of children for these will cause a heavy drain on women's - and children's labour that are normally responsible for hoeing the crops. The fact that every operation has to be carried out by hand makes the farm unattractive to the youths who tend to drift away from the rural areas to seek for work in the towns. Industrial development in these countries will accelerate this exodus of manpower from the farms.

The important feature on the few large farms that depend

on hired/

on hired labour is the rapid rise in the cost of agricultural labour compared with the value of agricultural products sold or consumed on the farms. This is very evident on most Government Agricultural Stations. On most of the large private farms, as it has been found uneconomic to continue growing annual food crops, the tendency is to establish permanent tree crops where conditions are favourable.

The above conditions will mean an ever decreasing farm hands producing enough food for the steadily increasing urban population. If the standard of living is to be maintained and increased, the answer will be to increase the productivity per rural man-power far above the present level.

To make work on the farm more attractive to young men and increase the present size of the family farms, or to reduce the wage bills where this applies, the output per man must be increased by reducing the amount of hand labour required for cultivation, including intercultivation, as much as possible.

An urgent problem is to discover what, if any, loss of yields occurs and the economic effect, when certain intercultivation operations are omitted or when cheaper and more rapid methods are substituted for the time-honoured but expensive clean hand-weeding. Due account should be taken of the effects of altering the methods for one year only and the cumulative effects if they are altered over a period of years.

Little is known at the present time in the humid tropics to what extent the tractor and other mechanical aids will be economic in displacing and / or supplementing manual labour. An extensive preliminary experiment was carried out by Lamrock (1953) in 1952 -53 on maize at the College New Farm on Field 5, which included different seed-bed preparation and intercultivation methods and their effects on the soil. He reported:-

(a) That in seed-beds, for an extra cost of \$11

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per acre for plough-discing over rotary hoeing, an increase in return of 53% per acre was obtained;

(b) That for an extra cost of £6 per acre for sub-soiling seed-beds over non-subsoiling, a net increase of £55 was derived.

(c) That the use of hand labour for intercultivation appeared not only prohibitive and uneconomic (definite values were not stated) as compared with rotary weeding but also showed a slight decrease in the yield of cobs produced. He further suggested that this depression due to hand hoeing might be the result of cutting the weeds at ground level without any cultivation of the soil and that better results may be obtained by working the soil deeper with the hoe, though the extra cost might out-weigh any increase in yields.

The scope of the present work is limited to the intercultivation aspect only. It is a more detailed investigation on the effect of different intercultivation methods on the yield of maize and an assessment of the extent these affect the farm balance sheet.

Work on the effects of these intercultivation methods on the soil physics by H. MacLean (1954) is still in progress. No attempt has, therefore, been made to include that aspect in this report.

Intercultivation and these may be summarised as follows:-

- (a) To destroy weeds.
- (b) To conserve moisture
- (c) To aerate the soil
- (d) To increase the availability of plant nutrients.

The relative importance of each of the above functions will vary according to the location and season and the preliminary ploughing tillage given to the soil.